

IMPACT OF SURFACTANTS AND EFFLUENTS ON SURFACE AND UNDERGROUND WATER QUALITY OF MATAYA INDUSTRIAL AREA

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ABSTRACT

Analysis of different parameters was undertaken to determine the effects of industrial pollution on various water bodies near Matsya Industrial Area. The water is taken from different sources like hand pump and open drainage system. Total 17 parameters were determined (APHA, 1998) Most of the Parameters like foul smell, nitrate, fluoride , TDS, hardness , BOD , COD were found to be higher than the prescribed limits. The water should not be used for irrigation and various other purposes without further treatment.

Keywords: BOD, COD, Effluents, Matsya Industrial Area.

Introduction

All the experiments were carried out by following the manual of water and wastewater analysis, 2005 and APHA standard methods for the examination of water and wastewater, 1998.

Results and Discussion

Two sources were selected for study and results are compared with standard parameters. The first source is open drainage near IET Alwar and second source is handpump in Gundpur village MIA, Alwar.

Samples of both of these sites were collected four times in a year for three consecutive years and results were tabulated and compared. (Table1- 6). The standard results are also given in the table. The water of open drainage is greyish black coloured and the odour is coming out from this drainage. The study for various parameters for this source is as follows:

The range for turbidity for all the three years is 20-60. The pH values varied from 7.1 to 7.8. The range of EC is 3900 micromhos to 7525 micromhos for all the three years. The total dissolved solids range is 2184 mg/l to 4210 mg/l for all the three years. Total hardness values are in the range of 970 mg /l to 1890 mg/l for all the three years. Calcium hardness range is 610 mg/l to 1260mg/l and magnesium hardness range is 360 mg/l to 660 mg/l for all the three years. For all the three years the values of total alkalinity varied from 460 mg /l to 810 mg/l. For chloride the range for all the three years is 520 mg per litre to 1345mg /l. For all the three years the values of nitrates varied from 90 mg /l to 140 mg/l. The

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range of fluoride is 1 mg/l to 2.2 mg/l. for all the three years. Sulphate range is 292 mg/l to 612 mg/l for all the three years (Kudesia V.P.,1980). The dissolved oxygen is zero in this water source. The values of BOD varied from 15 mg/l for all the three years. The range of COD is 48 mg/l to 2745 mg/l for all the three years. The total coliform is 2400MPN/ml this indicates that the water is bacteriologically highly contaminated. (Trivedi and Goel,1986). The higher values of various parameters are due to different industries. The second source chosen for underground water is hand pump Gundpur village MIA, Alwar.

The results are shown in the Table No. 4,5,6. The water of this source is light yellow coloured, turbid and with odour. The ground water of this source is polluted by industrial effluents of MIA (Manual for water and wastewater analysis,2005). This is a clear indication that the effluents released by different industries are leached into the soil and pollute the underground water (Handa, B.K.,1975).

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TABLE NO. 1 (Year 2017)
PHYSICO-CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF WATER
OPEN DRAINAGE NEAR I.E.T., M.I.A., ALWAR

SR. NO.	PARAMETERS	AUTUMN	SUMMER	MONSOON	WINTER
1	Colour	50	70	40	80
2	Oudour	Ob.	Ob.	Ob.	Ob.
3	Turbidity	30	20	60	20
4	pH	7.6	7.3	7.5	7.5
5	EC	3900	4570	3945	4315
6	Total Dissolved Solids	2184	2554	2210	2416
7	Total Hardness (as CaCO ₃)	970	1250	990	1180
8	Calcium Hardness (as CaCO ₃)	610	850	630	750
9	Magnesium Hardness (as CaCO ₃)	360	400	360	430
10	Total Alkalinity (as CaCO ₃)	460	650	550	620
11	Chlorides (as Cl)	520	610	565	595
12	Nitrate (as NO ₃)	90	125	95	95
13	Fluoride (as F)	1.8	2.0	2.0	1.5
14	Sulphate (as SO ₄)	292	386	312	340
15	DO	0	0	0	0
16	BOD	15	55	90	40
17	COD	48	124	255	96
18	Total Coliform (MPN/100ml)	≥2400	≥2400	≥2400	≥2400

Colour (Hazen Units), turbidity (NTU), EC (micro mhos/cm), Ob. = objectionable, pH (Units), rest of value are in mg/l.

TABLE NO. 2 (Year 2018)
PHYSICO-CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF WATER
OPEN DRAINAGE NEAR I.E.T., M.I.A., ALWAR

SR. NO.	PARAMETERS	AUTUMN	SUMMER	MONSOON	WINTER
1	Colour	40	110	70	50
2	Oudour	Ob.	Ob.	Ob.	Ob.
3	Turbidity	30	20	50	50
4	pH	7.6	7.1	7.4	7.3
5	EC	5070	6455	5600	5800
6	Total Dissolved Solids	2842	3618	3136	3248
7	Total Hardness (as CaCO ₃)	1220	1420	1330	1410
8	Calcium Hardness (as CaCO ₃)	780	890	920	960
9	Magnesium Hardness (as CaCO ₃)	440	530	410	450
10	Total Alkalinity (as CaCO ₃)	520	670	620	620
11	Chlorides (as Cl)	710	1125	765	810
12	Nitrate (as NO ₃)	120	135	125	105
13	Fluoride (as F)	1.0	1.9	1.4	2.2
14	Sulphate (as SO ₄)	508	612	568	590
15	DO	0	0	0	0
16	BOD	95	150	210	185
17	COD	463	300	412	495
18	Total Coliform (MPN/100ml)	≥2400	≥2400	≥2400	≥2400

Colour (Hazen Units), turbidity (NTU), EC (micro mhos/cm), Ob. = objectionable, pH (Units), rest of value are in mg/l.

TABLE NO. 3 (Year 2019)
PHYSICO-CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF WATER
OPEN DRAINAGE NEAR I.E.T., M.I.A., ALWAR

SR. NO.	PARAMETERS	AUTUMN	SUMMER	MONSOON	WINTER
1	Colour	50	130	30	60
2	Oudour	Ob.	Ob.	Ob.	Ob.
3	Turbidity	30	40	50	30
4	pH	7.5	7.8	7.6	7.3
5	EC	5570	7525	5740	6865
6	Total Dissolved Solids	3122	4210	3220	3846
7	Total Hardness (as CaCO ₃)	1310	1890	1400	1780
8	Calcium Hardness (as CaCO ₃)	880	1260	830	1120
9	Magnesium Hardness (as CaCO ₃)	430	630	570	660
10	Total Alkalinity (as CaCO ₃)	730	810	790	780
11	Chlorides (as Cl)	1100	1345	1185	1270
12	Nitrate (as NO ₃)	140	145	140	125
13	Fluoride (as F)	1.8	1.7	2.0	2.1
14	Sulphate (as SO ₄)	316	420	328	384
15	DO	0	0	0	0
16	BOD	80	90	310	235
17	COD	215	250	745	590
18	Total Coliform (MPN/100ml)	≥2400	≥2400	≥2400	≥2400

Colour (Hazen Units), turbidity (NTU), EC (micro mhos/cm), Ob. = objectionable, pH (Units), rest of value are in mg/l.

TABLE NO. 4 (Year 2017)
PHYSICO-CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF WATER
HAND PUMP, GUNDPUR VILLAGE, M.I.A., ALWAR

SR. NO.	PARAMETERS	AUTUMN	SUMMER	MONSOON	WINTER
1	Colour	0	0	0	0
2	Oudour	U.O.	U.O.	U.O.	U.O.
3	Turbidity	0	0	0	0
4	pH	7.3	7.5	7.4	7.4
5	EC	2400	2500	2460	2485
6	Total Dissolved Solids	1344	1400	1380	1392
7	Total Hardness (as CaCO ₃)	340	360	350	350
8	Calcium Hardness (as CaCO ₃)	240	250	240	250
9	Magnesium Hardness (as CaCO ₃)	100	110	110	100
10	Total Alkalinity (as CaCO ₃)	690	710	690	700
11	Chlorides (as Cl)	235	240	235	240
12	Nitrate (as NO ₃)	60	65	55	50
13	Fluoride (as F)	1.2	1.0	1.0	1.2
14	Sulphate (as SO ₄)	164	178	174	174
15	DO	5.8	5.5	5.7	5.7
16	BOD	0	0	0	0
17	COD	0	0	0	0
18	Total Coliform (MPN/100ml)	NIL	NIL	NIL	NIL

Colour (Hazen Units), turbidity (NTU), EC (micro mhos/cm), Ob. = objectionable, pH (Units), rest of value are in mg/l.

TABLE NO. 5 (Year 2018)
PHYSICO-CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF WATER
HAND PUMP, GUNDPUR VILLAGE, M.I.A., ALWAR

SR. NO.	PARAMETERS	AUTUMN	SUMMER	MONSOON	WINTER
1	Colour	5	10	10	10
2	Oudour	U.O.	U.O.	U.O.	U.O.
3	Turbidity	10	20	20	10
4	pH	7.4	7.5	7.4	7.4
5	EC	2540	2600	2565	2585
6	Total Dissolved Solids	1432	1456	1440	1450
7	Total Hardness (as CaCO ₃)	350	360	360	360
8	Calcium Hardness (as CaCO ₃)	240	230	230	250
9	Magnesium Hardness (as CaCO ₃)	110	130	130	100
10	Total Alkalinity (as CaCO ₃)	700	710	710	720
11	Chlorides (as Cl)	245	250	250	245
12	Nitrate (as NO ₃)	65	65	60	60
13	Fluoride (as F)	1.0	1.0	1.0	1.0
14	Sulphate (as SO ₄)	184	192	192	180
15	DO	5.4	5.2	5.4	5.4
16	BOD	0	0	0	0
17	COD	0	0	0	0
18	Total Coliform (MPN/100ml)	NIL	NIL	NIL	NIL

Colour (Hazen Units), turbidity (NTU), EC (micro mhos/cm), Ob. = objectionable, pH (Units), rest of value are in mg/l.

TABLE NO. 6 (Year 2019)
PHYSICO-CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF WATER
HAND PUMP, GUNDPUR VILLAGE, M.I.A., ALWAR

SR. NO.	PARAMETERS	AUTUMN	SUMMER	MONSOON	WINTER
1	Colour	30	60	50	50
2	Oudour	Ob.	Ob.	Ob.	Ob.
3	Turbidity	20	20	30	10
4	pH	7.3	7.5	7.4	7.5
5	EC	2660	2700	2675	2680
6	Total Dissolved Solids	1480	1512	1498	1500
7	Total Hardness (as CaCO ₃)	370	370	370	370
8	Calcium Hardness (as CaCO ₃)	240	240	250	260
9	Magnesium Hardness (as CaCO ₃)	130	130	120	110
10	Total Alkalinity (as CaCO ₃)	720	730	730	730
11	Chlorides (as Cl)	255	260	255	260
12	Nitrate (as NO ₃)	65	75	75	75
13	Fluoride (as F)	1.0	1.0	1.0	1.0
14	Sulphate (as SO ₄)	192	198	194	190
15	DO	6.0	5.7	5.8	6.0
16	BOD	0	0	0	0
17	COD	0	0	0	0
18	Total Coliform (MPN/100ml)	Nil	Nil	Nil	Nil

Colour (Hazen Units), turbidity (NTU), EC (micro mhos/cm), Ob. = objectionable, pH (Units), rest of value are in mg/l.

TABLE

Drinking Water Standards IS: 10500, 1991

S.No.	Parameters	Requirement Desirable Limit	Permissible limit in the absence of alternate source
1	Colour	5 HU	25 HU
2	Odour	UO	UO
3	Temperature	-	-
4	pH	6.5 to 8.5	No relaxation
5	Turbidity	5	10
6	EC	-	-
7	DO	-	-
8	Total Hardness As CaCO ₃	300	600
9	Total Solids	500	2000
10	Total Alkalinity	200	600
11	Chloride	250	1000
12	Sulphate	200	400
13	Calcium as Ca	75	200
14	Magnesium	30	100
15	Fluoride	1.0	1.5
16	MPN of coliform	Free from Coliform	10 or < 10 Coliform

Note :- No standards: UO= Unobjectionable: Units: Except Colour (Hazen Unit), pH (Units), Turbidity (NTU), mhos/cm), MPN (coliform per 100 ml. of water), rest of values are in mg/l.

